

Original Research Article

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Effect of Nitrogen and Spacing Levels on Growth and Yield Parameters of Kasuri methi (*Trigonella corniculata* L.) var. Pusa Kasuri

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ABSTRACT

Keywords

Kasuri methi (*Trigonella corniculata* L.) var. Pusa Kasuri, Nitrogen levels, Spacing levels, Growth and yield parameters.

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A field experiment was conducted with 4 nitrogen and 4 spacing levels in factorial randomized block design with three replications. Maximum plant height, number of branches, number of leaves, total dry matter accumulation per plant and fresh and dry yield per plant and per hectare were recorded when the crop was applied with 80 kg N/ha with a spacing of 30 x 20 cm (N₄S₄) under the Northern dry zone of Karnataka.

Introduction

Kasuri methi (*Trigonella corniculata* L.) is a semi-arid crop belonging to the family Fabaceae. It is commonly known as Champa methi' and 'marwari methi', is a diffused sub erects and strongly scented annual herb. It remains rosette condition during most of the vegetative growth period (Anon., 2004).

It is originated in Mediterranean region and near east countries. The dried leaves are the economic part of this plant. In India, it is mainly grown in northern states like Maharashtra Rajasthan, Gujarat, Uttarpradesh, Madhya Pradesh, Haryana and Punjab.

Rajasthan occupies 80 per cent area and production of Kasuri methi in the country.

Kasuri methi is a multipurpose crop. Its every part is useful and is utilized in one or other forms as food, fodder, medicine and cosmetics. The fresh green leaves are used as condiment for giving delicious flavor. These have an aromatic odor and agreeable spicy taste. Being odoriferous, the dried seeds and their powder are used as condiment flavoring agent and for medicinal purposes.

Kasuri methi is recognized as a vital source of essential minerals, vitamins and dietary fibers.

The green leaves contain several alkaloids like *trigonelline*, *choline*, *gentianine* and *carpain*. It contains moisture (86.1%), protein (4.4%), fat (0.9%), fiber (1.1%), other carbohydrates (6%) and ash (1.5%). In addition, leaves are rich source of vitamins such as carotene (2.34 mg/ 100g of fresh edible portion), thiamine (0.04 mg), riboflavin (0.31 mg), nicotinic acid (0.8 mg) and vitamin C (52.0 mg/ 100g of edible portion).

Kasuri methi has many uses such as flavoring and medicinal purpose, is gaining importance in recent years and there is a good demand for the dried leaves in the market. The dried leaves are regularly sold in the super markets as popular flavoring material. The scientific information on cultivation and nutrient management of this crop is very less.

Materials and Methods

A field experiment was conducted at the department of Plantation, Spices, Medicinal and Aromatic Crops, Kittur Rani Channamma College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot from November, 2011 to January, 2012. Geographically, the Arabhavi lies in the Zone-3 of Region-2 in the agro-climatic zone of Karnataka. It is situated at 16°15' North latitude and 74°45' East longitude and at an altitude of 612 m above the mean sea level. The soil of the experimental site was medium deep black in texture. The experiment was laid out with 4 levels of nitrogen N₁- 20 kg, N₂- 40 kg, N₃- 60 kg and N₄- 80 kg N/ha and spacing levels *viz.*, S₁- 20 x 10 cm, S₂- 20 x 20 cm, S₃- 30 x 10 cm and S₄- 30 x 20 cm. It was laid out in RBD with factorial concept in three replications.

Healthy seeds of variety Pusa Kasuri were used for sowing. They were sown on 28th November, 2011 as above mentioned spacings. Furrows were properly covered with

a thin layer of soil and the plots were irrigated with small stream of water. Farm yard manure was applied one week before the sowing of crop at the rate of 10 tones per hectare as a common dose for all the treatments. The plots were supplied with half the dose of nitrogen (in the form of urea) and full dose of phosphorus (in the form of single super phosphate) as per the treatments.

The remaining half dose of nitrogen was supplemented 30 days after sowing as top dressing and the light earthing up was done. Observations on growth and yield parameters were recorded using five plants per plot and the data collected during the study was subjected to Statistical analysis using the Fischer's method of analysis of variance technique as given by Panse and Sukhatme (1967).

Results and Discussion

The plant height, number of branches, number of leaves and dry matter production gram per plant responded significantly to nitrogen levels. Maximum plant height of 19.02 cm number of branches (7.35), number of leaves (71.04) and total dry matter accumulation (15.96 g) were recorded with the application of 80 kg N per hectare (N₄) (Table 1). These results are in close proximity with the findings of Naveen (2010) in Kasuri methi, Jamal (2009) in *Mentha spicata L*, Tuncturk *et al.*, (2011) in fenugreek, Sharma (2000) in fenugreek and Patidar *et al.*, (2004) in cumin.

The increase in plant height, number of branches, number of leaves and dry matter production per plant was observed with an increase in spacing. Maximum plant height (17.57 cm), number of branches (6.86), number of leaves at 60 DAS (61.59) and dry matter production (14.03 g/plant) at 75 DAS were recorded with the crop spaced at 30 x 20 cm (S₄). The results are in agreement with the

findings of (Ramachandra *et al.*, 2002) in patchouli, Umesha *et al.*, (1990) in clocimum and Shivajiprasad and Saxena (1980) in pepper mint.

Table.1 Effect of nitrogen and spacing levels on plant height, number of branches, number of leaves and total dry matter at different stages of plant growth of Kasuri methi (*Trigonella corniculata* L.) var. Pusa Kasuri

Treatment	Plant height (cm)	Number of branches	Number of leaves	Total dry matter (g/plant)
Nitrogen level (N)				
N ₁ : 20 kg/ ha	16.16	6.54	52.64	10.33
N ₂ : 40 kg/ ha	17.15	6.61	56.15	12.75
N ₃ : 60 kg /ha	17.32	6.76	64.39	13.71
N ₄ : 80 kg /ha	19.02	7.35	71.04	15.96
Mean (N)	17.41	6.81	61.05	13.19
S.Em±	0.18	0.03	0.45	0.08
CD @ 5 %	0.51	0.1	1.29	0.23
Spacing level (S)				
S ₁ : 20x10 cm (50,000 plants/ha)	17.29	6.78	60.56	12.4
S ₂ : 20x20 cm (25,000 plants/ha)	17.37	6.8	60.8	12.95
S ₃ : 30x10 cm (3, 33000 plants/ha)	17.43	6.83	61.27	13.37
S ₄ : 30x20 cm (1, 66000 plants/ha)	17.57	6.86	61.59	14.03
Mean (S)	17.41	6.78	61.05	13.19
S. Em±	0.18	0.03	0.45	0.08
CD @ 5 %	NS	NS	NS	0.23
Interaction (N x S)				
N ₁ S ₁	16.08	6.49	52.03	9.49
N ₁ S ₂	16.17	6.53	52.49	9.97
N ₁ S ₃	16.18	6.55	52.74	10.54
N ₁ S ₄	16.22	6.61	53.29	10.97
N ₂ S ₁	17.1	6.56	55.66	11.3
N ₂ S ₂	17.14	6.59	55.74	11.58
N ₂ S ₃	17.17	6.63	56.29	12.59
N ₂ S ₄	17.19	6.66	56.89	13
N ₃ S ₁	17.21	6.73	63.65	13.83
N ₃ S ₂	17.33	6.74	64.01	13.22
N ₃ S ₃	17.33	6.77	64.89	13.58
N ₃ S ₄	17.42	6.79	64.98	13.71
N ₄ S ₁	18.76	7.33	70.89	14.32
N ₄ S ₂	18.83	7.34	70.96	15.3
N ₄ S ₃	19.04	7.36	71.14	15.64
N ₄ S ₄	19.45	7.37	71.18	16.23
Mean (N x S)	17.41	6.81	61.05	16.68
S.Em±	0.35	0.07	10.89	0.16
CD at 5 %	1.02	0.19	2.58	0.47

* DAS- Days after sowing, NS: Non significant

Table.2 Effect of nitrogen and spacing levels on Fresh and dry yield of Kasuri methi (*Trigonella corniculata* L.) var. Pusa Kasuri

Treatment	Fresh yield (g/plant)	Fresh yield (t/ha)	Dry yield (g/plant)	Dry yield (t/ha)
Nitrogen level (N)				
N ₁ : 20 kg/ha	55.23	17.15	11.00	3.42
N ₂ : 40 kg /ha	57.87	17.99	11.58	3.59
N ₃ : 60 kg /ha	59.61	18.59	12.10	3.77
N ₄ : 80 kg /ha	63.36	19.61	12.55	3.90
Mean (N)	59.02	18.33	11.81	3.67
S.Em±	0.42	0.13	0.03	0.01
CD @ 5 %	1.22	0.39	0.08	0.03
Spacing level (S)				
S ₁ : 20x10 cm(50,000 plants/ha)	57.77	28.88	11.60	5.80
S ₂ : 20x20 cm(25,000 plants/ha)	58.4	14.6	11.72	2.93
S ₃ : 30x10 cm(3, 33000 plants/ha)	59.54	19.83	11.87	3.95
S ₄ : 30x20 cm(1, 66000 plants/ha)	60.36	10.02	12.04	2.00
Mean (S)	59.02	18.33	11.81	3.67
S.Em±	0.42	0.13	0.03	0.01
CD @ 5 %	1.22	0.39	0.08	0.03
Interaction (N x S)				
N ₁ S ₁	54.02	27.01	10.74	5.37
N ₁ S ₂	54.55	13.64	10.90	2.73
N ₁ S ₃	55.7	18.55	11.11	3.70
N ₁ S ₄	56.63	9.4	11.25	1.87
N ₂ S ₁	56.63	28.32	11.29	5.65
N ₂ S ₂	57.48	14.37	11.46	2.86
N ₂ S ₃	58.57	19.5	11.67	3.89
N ₂ S ₄	58.8	9.76	11.88	1.97
N ₃ S ₁	59.22	29.61	11.97	5.99
N ₃ S ₂	59.59	14.9	12.07	3.02
N ₃ S ₃	59.73	19.89	12.13	4.04
N ₃ S ₄	59.9	9.94	12.24	2.03
N ₄ S ₁	61.2	30.6	12.38	6.19
N ₄ S ₂	61.98	15.5	12.47	3.12
N ₄ S ₃	64.16	21.37	12.56	4.18
N ₄ S ₄	66.1	10.97	12.80	2.13
Mean (N x S)	59.02	18.33	11.81	3.67
S.Em±	0.84	0.27	0.06	0.02
CD at 5 %	2.44	0.77	0.16	0.06

The interaction effect of nitrogen and spacing levels was found significant with respect to plant height, number of branches, number of leaves and total dry matter accumulation per plant. The treatment combination of 80 kg N per hectare with 30 x 20 cm (N₄S₄) recorded maximum plant height (19.45 cm), number of branches (7.37), number of leaves (71.18) and total dry matter accumulation per plant (16.23 g). This could be attributed to the enhanced availability of fertilizers at the appropriate time along with congenial climatic conditions, which might have resulted in increased photosynthetic rate and accumulation of metabolites in plants (Table 1).

Application of 80 kg N per hectare (N₄) resulted in production of maximum fresh and dry yield per plant and per hectare (Table 2). The increase in yield might be attributed to the fact that under increasing nitrogen levels, there would be luxuriant growth of the plant which is evident from vegetative growth, which led to the production of more fresh and dry herbage yield.

The fresh and dry herb yield per plant, maximum value was recorded in wider spacing of 30 x 20 cm (S₄) (Table 2). Whereas, the minimum yield was noticed in closer spacing of 20 x 10 cm (S₁). The higher yield might be due to more number of branches, leaves, and dry matter per unit area. The different spacing levels showed significant variation on fresh and dry yield of herb per hectare. The closer spacing of 20 x 10 cm (S₁) produced significantly higher fresh and dry herb yield per hectare, while the minimum yield per hectare was recorded in 30 x 20 cm (S₄). The higher yield might be due to more number of plants per unit area. Similar results were observed earlier by Pal *et al.*, (1987) *Ocimum viride*, Prakasarao *et al.*, (1983) in davana, Farooqi *et al.*, (1990) in davana and Harshavardhan *et al.*, (2005) *Melissa officinalis* L.

The interaction effect between nitrogen and spacing levels differed significantly with respect to fresh and dry herb yield. The fresh and dry yield per plant was recorded maximum (66.10 g and 12.80 g) in N₄S₄ and the minimum (54.02 g and 10.74 g) was observed in N₁S₁ (Table 2). This might be due to combined effect of treatments and active growth period which contributed to maximum fresh and dry yield per plant. Interaction effect was significantly differed in fresh and dry yield per hectare. The higher nitrogen dose with closer spacing that is 80 kg N per hectare with 20 x 10 cm spacing (N₄S₁) recorded maximum fresh and dry herb yield per hectare and the least was observed in N₁S₄. This might be due to application of higher nitrogen and more population per unit area which helped in accumulation of more biomass and dry matter in the plants. The results are conformity with the results of Gupta and Shahi (1999) in *Ocimum canum*, Randhawa *et al.*, (1996) in dill and Yadav *et al.*, (1983) in Japanese mint.

From the present investigation, it can be concluded that the Kasuri methi is beneficial for obtaining the maximum growth and higher yields, under the northern dry zone of Karnataka.

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